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ABSTRACT

The Further Education (FE) sector in the United Kingdom has devoted time, energy, and resources in recent years to the development and improvement of information systems known as management-information systems. This report presents the findings of a research project on the use of management-information systems in student tracking. The project was established and funded by the Further Education Development Agency (FEDA) and the Further Education Funding Council (FEFC) in response to demand from colleges in the FE sector. The project sought to develop a model that colleges could use when specifying software to track students' progress. The model accounts for student mobility, prior learning, credit accumulation and transfer, and records of achievement. The report also offers recommendations for sector institutions, the FEFC, software suppliers, and FEDA. Proposals for the next phase of the project are outlined. The research reflects the move from gathering global information about student populations toward gathering information about and for individuals. Ten figures are included. Appendices contain a list of project team members, case studies, a bibliography of 15 references, and a glossary. (LMI)

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Towards better Student Tracking Systems

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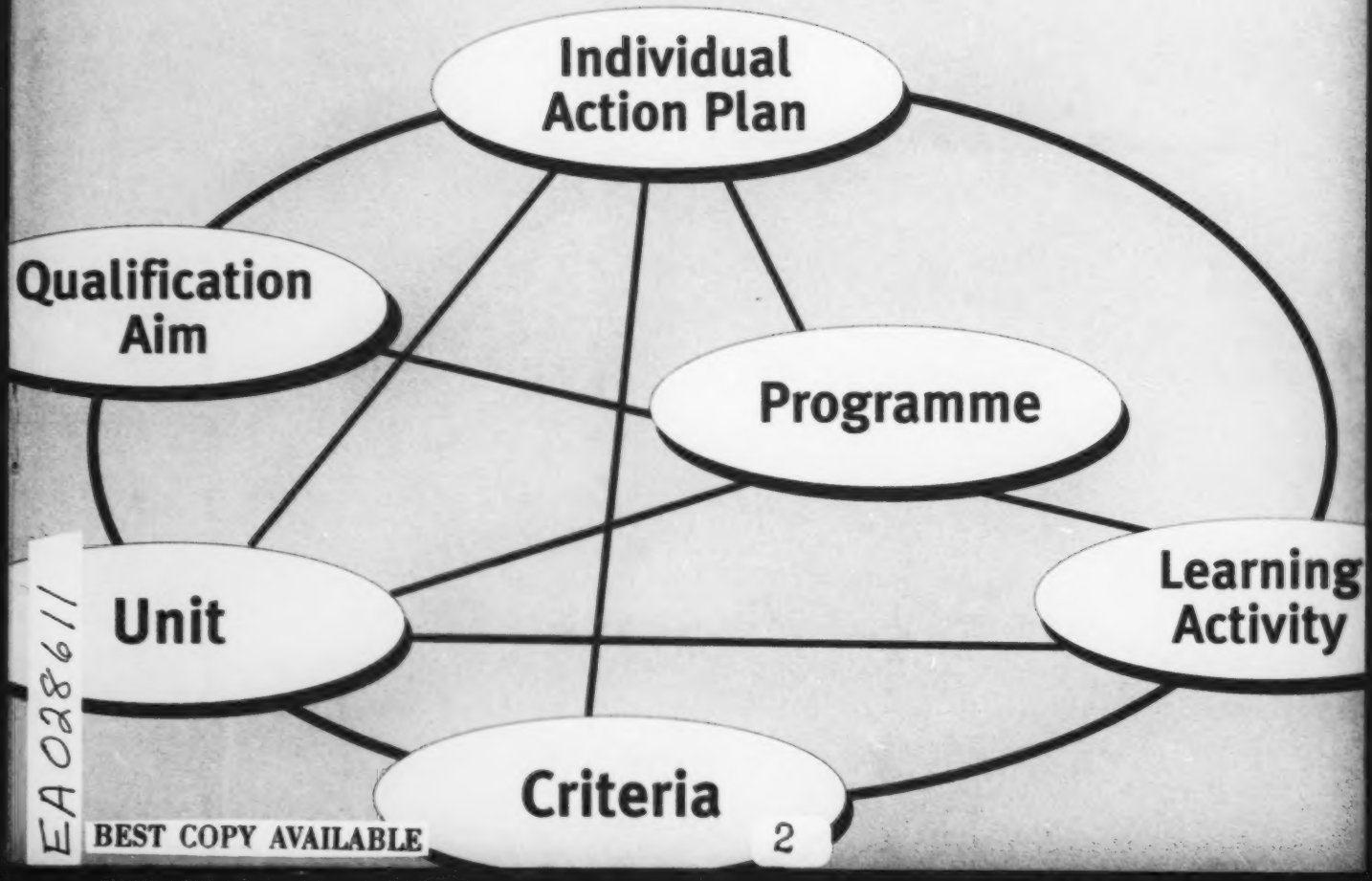

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1 Introduction

This report presents the findings (to date) of a research project on student tracking. The project was set up, and jointly funded by, the FEFC and FEDA in response to expressed demand from a number of colleges in the FE sector.

The project brief was to devise a model which colleges could use when specifying software to track students' progress. The model will take account of; students who move in and out of education over a number of years; prior learning; credit accumulation and transfer, and records of achievement.

In addition to the draft specification, the report also makes a number of recommendations for sector institutions, the FEFC, software suppliers and FEDA. It also includes outline proposals for the next phase of the work.

This publication forms part of the QUILT programme, of which student tracking will continue to form a key element.

The project was managed by FEDA and conducted by representatives of Further Education institutions in England. There is a list of the project team members in Appendix 1.

2 Terms of reference

2.1. Aim of the project

The aim was to develop a functional specification for a comprehensive student tracking system which will

- support the evolving requirements of life long learning within an increasingly flexible learning environment
- interface to processes for the accreditation of prior learning
- interface to systems for embedding credit accumulation and transfer
- result in the production of a portable record of achievement

2.2 Objectives of the project

The objectives were to

- work with colleges to establish a high level, detailed but flexible, specification for a student tracking system
- achieve sector consensus on the requirement specification
- develop subsequently a model prototype system specification and technical specification
- explore a realistic time scale to align effective student tracking systems with more flexible methods of learning and accreditation
- consider the subsequent time scale and resource implications for the first phase

3 Background and Rationale

The FE sector has devoted time, energy and resources in recent years to the development and improvement of information systems – usually computer-based, and known as management information systems (MIS).

Many colleges first developed systems to provide statistics to the (then) DES and the Welsh Office (eg. the Further Education Statistical Return and the Annual Monitoring Survey) . Refinements to the systems began in the late 1980s following criticisms that MIS were too unwieldy. They were suited for their original purpose but not for the provision and manipulation of management (as opposed to administrative) information. This process of refinement has continued since the incorporation of colleges in 1993, and the consequent and subsequent revised and expanded data demands of the Funding Councils. There has been a move from interest in global information about groups and populations of students towards information about, and for, individuals. This is reflected in the current FEFC funding methodology which is based on an Individualised Student Record (ISR).This important shift in focus is at the heart of this report.

The data required for the ISR and the calculation of funding is a subset of information required for the management of a student's learning. However, the decisions leading to the maximisation of an institution's funding can easily clash with decisions regarding a student's individual learning needs. Systems therefore have to meet two, sometimes conflicting, purposes (see Fig. 1). This project has concerned itself with issues of student tracking, but has made recommendations to progressively reduce this conflict and move towards a situation where student or client requirements are central (see Fig. 2).

Fig. 1

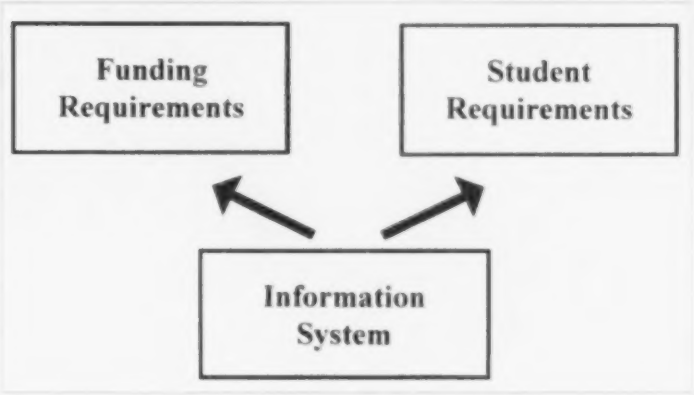
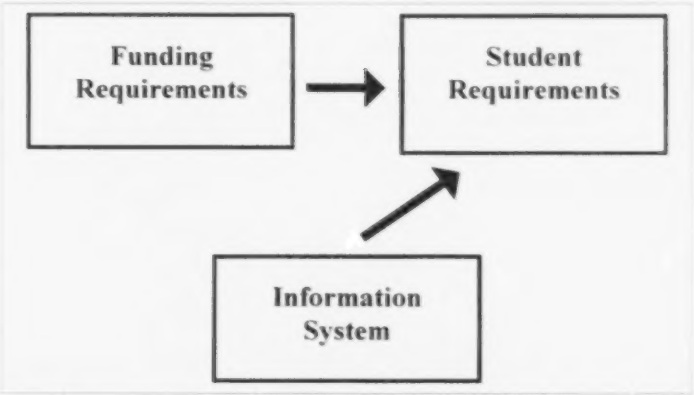


Fig. 2



The greatest pressure upon colleges to develop an integrated student tracking system, has been the introduction of three part funding. Formerly, college funding was based largely on student numbers on a particular census date (and an assumption that most of them were in cohesive groups of a years block duration). Now, colleges are funded separately for recruiting students, for their period on a learning programme (with guided learning hours), and for their achievements. To maximise funding, colleges now need accurate information about each student at each of these phases.

The FEFC (Circular 95/11) announced that its tariff advisory committee had set up three sub-groups to undertake further research into funding methodology. These include one on extending the number of individually-listed qualifications, cost-weighting factors, and the emergence of a credit framework for qualifications, with implications for some of the issues discussed in this report.

At the same time as these funding changes have taken place, learning programmes have become more diverse, and potentially fragmented. Within the parameters of a college's curriculum offer and the resources and support available, students can elect to follow an individualised learning programme and assessment regime which suits their particular circumstances and requirements. This is possible where discrete programmes rae divided into modules of delivery, which can be combined in various ways. The biggest single impetus for this change is the unitisation of the curriculum. Colleges which adopt the credit framework know that units of assessment from a range of academic, vocational and pre-vocational programmes can be measured, compared and (if necessary) combined in valid and reliable ways.

As emphasis is now being placed upon self-assessment, colleges will need to adopt systems capable of accurately recording all aspects of individual students' achievement and calculating value added. This information will support internal quality assurance processes and reviews at all levels within the institution.

None of this is possible unless the technology and tools are available. Existing software developers have revised their products to take account of the need to track students, and new products have appeared to fill perceived gaps in the market. Colleges have also been reviewing their related needs, their processes and procedures in the interests of efficiency and effectiveness. The new funding regimes demand an individualised student record (ISR); colleges have sought guidance from national bodies and their professional organisations on how associated practice might be developed for purposes of curriculum management. Surveys by FEDA suggest the sector is concerned about the ability of information systems to support these enhanced functions. In addition to external demands, colleges wish to plan to meet the needs, and the tracking requirements, of the learner of the future.

In general , there is a perception that currently

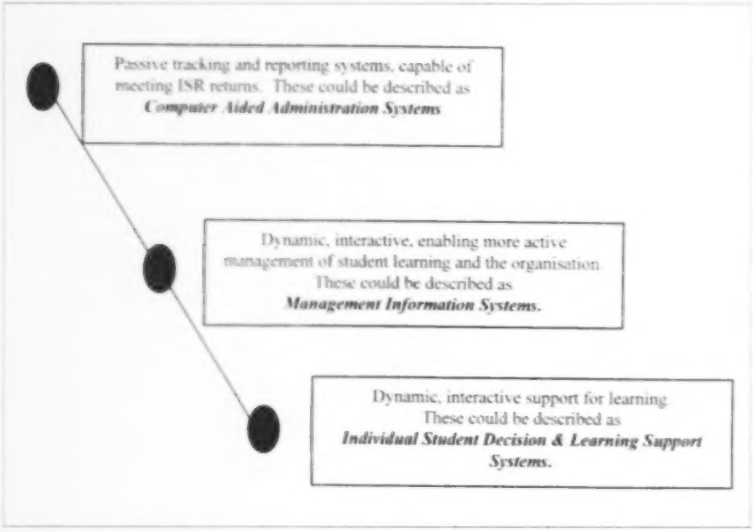
- the purpose of student tracking is to support the management, organisation and effective deployment of resources within the institution
- the term 'student tracking' sets conceptual thinking about audits rather than enabling the learning process
- FEFC funding methodology drives student tracking
- student tracking is constrained by historical practice, culture and systems.
- student tracking is more about reporting than being dynamic, interactive and enabling
- the lack of a national steer constrains development of (for example) CATS and unitisation, which are component parts of student tracking
- available systems are incapable of holistically tracking students.

The challenge for student tracking

The purpose of a student tracking system is not merely to track the student but to provide different views, of a totally comprehensive picture, to a range of users, thus enabling them to make the best possible decisions about a student's learning.

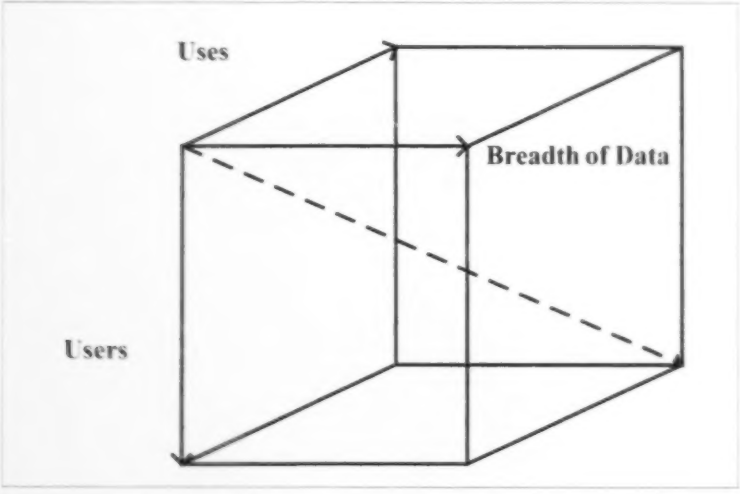
The diagram below (Fig. 3) shows the progression from passive recording systems, which store huge volumes of otherwise unused, and often inaccessible, data, to systems which utilise data and provide methods of monitoring all aspects of an institution's resource usage, and finally to the fully integrated system which incorporates e-mail, tutorial records, on-line assessment, records of achievement etc. and makes them accessible to a diverse range of users for the purpose of managing learning.

Fig. 3


Passive tracking and reporting systems, capable of meeting ISR returns. These could be described as *Computer Aided Administration Systems*
Dynamic, interactive, enabling more active management of student learning and the organisation. These could be described as *Management Information Systems.*
Dynamic, interactive support for learning. These could be described as *Individual Student Decision & Learning Support Systems.*

The progression through the continuum can be considered by reference to three axes of the cube depicted in Fig. 4. The idealised student tracking system is as far from the origin as possible along every axis, as shown in the diagram below (Fig.4).

Fig.4



Many Colleges are still struggling with the demands of the ISR and very few have effective management information systems. The challenge is to progress our thinking and our operation further along that continuum to ensure that student tracking places the individual learner's needs at the heart of the system.

5 Strategic Issues

The value and success of a student tracking system should be measured by how well it supports learning. The system should be able to provide information to curriculum staff about their students and students with information about the curriculum and their progress. Primarily the student tracking system should be geared to staff and students with FEFC reports and ISR returns being products of the system rather than its purpose.

5.1 Potential benefits

These include

- improved support for the autonomy of the learner
- improved quality of student information
- calculation of costs at all levels of aggregation
- the opportunity to demonstrate real student achievement through value added
- improved resource management
- support for self-assessment
- improved monitoring of students
- improved support for tutors
- improved targeted recruitment
- improved strategic/business planning

5.2 Issues to be addressed

- the sector needs to consider the financial implications of developing comprehensive student tracking systems. However, it is suggested the question to be asked is not whether the sector can afford to, but rather can it afford not to.
- consultation within the sector has highlighted differences between colleges in their ability to move from passive to enabling systems.
- **the need for cultural change** – a comprehensive tracking system requires a whole college approach which involves students and staff to create a dynamic interactive system which provides support for learning and the management of learning rather than the narrower aim of support for the management of the institution.
- **one source of 'official' information** - it is important that there is agreement on, and a commitment to, a single source of information which is used by all. Deficiencies must be addressed by modifications / additions / alterations to the tracking system and not by developing a separate 'private' system which gives users a 'choice' of answers and consequently an inconsistent view of the world.
- **data ownership and entry** – should be clearly defined and understood. The more diverse and comprehensive the data becomes the greater the number of people who are involved in ensuring correct, comprehensive and timely data.
- **access to information**
  - who gets access to what to avoid problems of data security and information overload?
  - what level of data aggregation is required for which user?
  - what methods of access are to be provided? Full interactive, on-line access with the ability to make ad hoc queries is the highest cost option in terms of the technical infrastructure and user development/training.
- **staffing** – high quality information as a strategic resource will have a real value to the college and will require investment. It will be necessary to ensure that the levels of staffing are adequate to enable data management and to keep the systems running, developing and take advantage of technological developments.
- **staff development** – the cultural change, organisational change and changing roles of staff will require a focused staff development programme.
- **data collection** – an analysis of the data required will have to be followed by an estimation of volume and a strategy for its collection and maintenance.

- **implementation and maintenance strategies** – a project plan for the phased implementation of the system and a strategy for its maintenance will be necessary.
- **planning for the learner of the future** – systems will be required to cater for the virtual student/ classroom and for those learners who are totally technology supported.
- **technological infrastructure** – an increase in the volumes of data and the numbers of users will necessitate an infrastructure which is capable of supporting them. It must place as few limitations as possible on the time and place at which the system can be accessed and operate at an acceptable speed.
- **security** – careful planning will be needed to ensure that ease of access does not compromise the data or physical security of the system. The facility to limit access to only the appropriate classes of data for each user will be imperative.

6 Essential features of a student tracking system

The project team's research has indicated that there are a number of features essential to Student Tracking Systems. These include

- compatibility with Mission, Strategic Plan and Information/IS/IT Strategies
- production of student related information to support internal management
- production of student related information for external reporting requirements
- support for fully modular delivery of learning
- support for individual student programmes of study, action plans and records of achievement
- support for virtual college philosophy (ie. learning may take place in college, the workplace, resource centres, at home, in partner organisations, etc.)
- support for flexible scheduling of learning i.e. not restricted to traditional academic sessions and terms
- ability to monitor usage of resources of all types and produce quantitative data (eg. staff contact time, time in library, books borrowed, time using on-line learning resources, time in open learning centres, courseware/software used, etc.)
- interfaces to processes for the accreditation of prior learning
- interfaces to systems for embedding credit accumulation and transfer
- no re-keying of data already existing within the system
- quick and easy importing and exporting of data
- transparent integration of all student tracking system modules

This list includes features identified to date but is not definitive or exhaustive.

7 Context Diagram

The diagram opposite highlights the centrality of the student information system, together with some of the discrete elements which influence it. These therefore require integration into the system. Current systems are unable to holistically track students and this is likely to remain the case unless the technology and tools are available.

Context Diagram

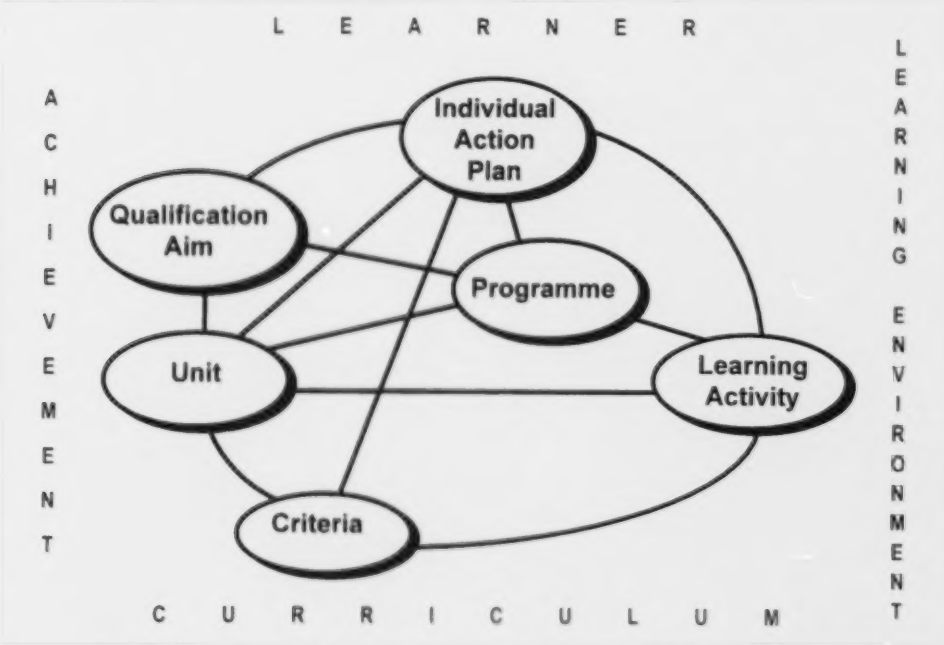
8 The student tracking model – the on-programme stage

The following diagram shows the relationships between some of the key elements of the on-programme stage.

The Individual Action Plan (IAP) is the key tracking record of an individual student which at any time forms a central part of a students record of achievement .

The diagram highlights the constraints of a funding methodology which sees the Qualification aim as the lowest level at which a student may achieve. As colleges continue to modularise/unitise their curriculum there will be a need to track at sub levels of qualification (ie. at unit level).

Learning activities identify the environment and resources used by the learner in completing their individual action plan. By learning activities we mean the how, where and when the student learns. As colleges continue to introduce alternative delivery, it will be necessary to address the integration between the learning environment and student achievement.


L E A R N E R
A C H I E V E M E N T
L E A R N I N G E N V I R O N M E N T
C U R R I C U L U M
Individual Action Plan
Qualification Aim
Programme
Unit
Learning Activity
Criteria

9 Model – Description

Common understanding of key definitions and terms is essential to inform systems design and usage. The following definitions underpin the specification of requirements.

9.1 Individual Action Plan

Definition

The Individual Action Plan (IAP) is the key tracking record for an individual a student. It is also a student's record of achievement. The IAP records the key information about their plans, activities and achievements against personalised agreed criteria.

Explanation

This dynamic record of a students learning and achievements will be constantly updated throughout their time at college. It is the place where all the information ona student is brought together.

Data

The data contained within the IAP will include

- student's details
- unique identifier
- personal tutor identifier
- guidance/review/action planning information
- links to learning and achievement data

Links

Table	Relationship
Qualification aim	one to many
Unit	one to many
Criteria	one to many
Learning activity	one to many
Personal data	one to one
Student history	one to one
Staff data set	one to one

9.2 Qualification aim

Definition

The qualification which can be achieved by a learner, as listed in the college database (including FEFC and HEFC linked Qualifications and definitions).

It is also used for funding purposes.

Examples

A level Mathematics or GNVQ Business (the awarding body is not necessarily part of the qualification aim).

Data

- qualification aim
- qualification aim code on FEFC database
- internal qualification aim code
- Guided Learning Hours
- awarding body
- awarding body code
- date of Internal Validation (links to internal quality systems)
- level
- projected numbers
- fee
- qualification co-ordinator
- NTET status

For individuals, data includes

- start date
- expected end date
- completion status (with reason for withdrawal from QA and option for part achievement)
- date achieved
- credit value
- Guided Learning Hours

Links

Table	Relationship
IAP	many-to-one
Programme of Study	many-to-many
Unit	many-to-many

9.3 Unit

Definition

The unit of assessment is a coherent set of learning outcomes (elements). It is the smallest block of accreditation which a student can achieve

Example

A GNVQ unit, an A level module, an Open College unit, etc.

Data

- Unit title
- Unit Code
- Guided Learning Hours
- Awarding Body
- Level
- Targets
- Fee
- Unit co-ordinator

For individuals, data includes

- start date
- end date
- completion status (allowing for effective monitoring of past achievement)
- date achieved
- credit value
- date verified by awarding body

9.4 Criteria

Definition

These are the smallest parts of units of assessment. They are statements which enable judgements to be made as to whether or not a learning outcome has been achieved

Data

- criteria title
- criteria code

For individuals, data includes

- completion status (allowing for effective monitoring of past achievement)
- date achieved

Links

Table	Relationship
Unit	one to many
Activity	one to many

9.5 Programme

Definition

A collection of learning and assessment activities.

This is not synonymous with the FEFC programme definition.

Explanation

The use of programme in this way provides the organisation with the opportunity to structure its curriculum offer, resources and the tracking system itself by simplifying the linking processes.

Data

- qualification aim
- unit
- criteria
- learning activity
- programme co-ordinator

For individuals, data includes

- start date
- expected end date
- completion status

Links

Table	Relationship
Qualification aim	one to many
Unit	one to many
Criteria	one to many
Learning Activity	one to many
Staff data set	one to one

9.6 Learning activities

Definition

Learning activities identify the environment and resources used by the learner in completing their individual action plan .

Explanation

Learning activities can comprise, for example, any one or many of the following

- induction
- tutorials
- workshops
- projects
- supported study
- independent study
- learner/learning resources
- work placement
- course work
- interactive learning with
  - peers
  - staff
  - information

Data

To deal with the different types of learning all learning activities will require defining in terms of their different data capture requirements

- Activity title
- Activity code
- case load
  - time allocated
  - time spent (cumulative log)
  - activity eg. tutorial, APL, portfolio development
  - venue
  - tutor
- class based delivery
  - start and end dates
  - content
  - tutor
  - timetable information
  - venue
  - times
  - max and min numbers
- workshop
  - location
  - tutor
  - Venue
  - times
  - max and min numbers
- resources
  - start and end dates
  - time spent
  - content
  - tutor information
  - completion details
- Fee
- Learning outcomes

Links

Table	Relationship
Programme	one to many
Other learning activities	one to many
IAP	one to many
Unit	one to many
Criteria	one to many
Staff data set	one to many

Note

It should be possible to attach fees at any stage of the model. Wherever they are included, the following data is required

- fees expected
- fees received
- reasons for non/partial payment

10 Learner Life History Diagrams

The Learner Life History Diagrams chart the possible routes learners may follow as they continue their post-16 education and training.

Diagram 1 **Overview**

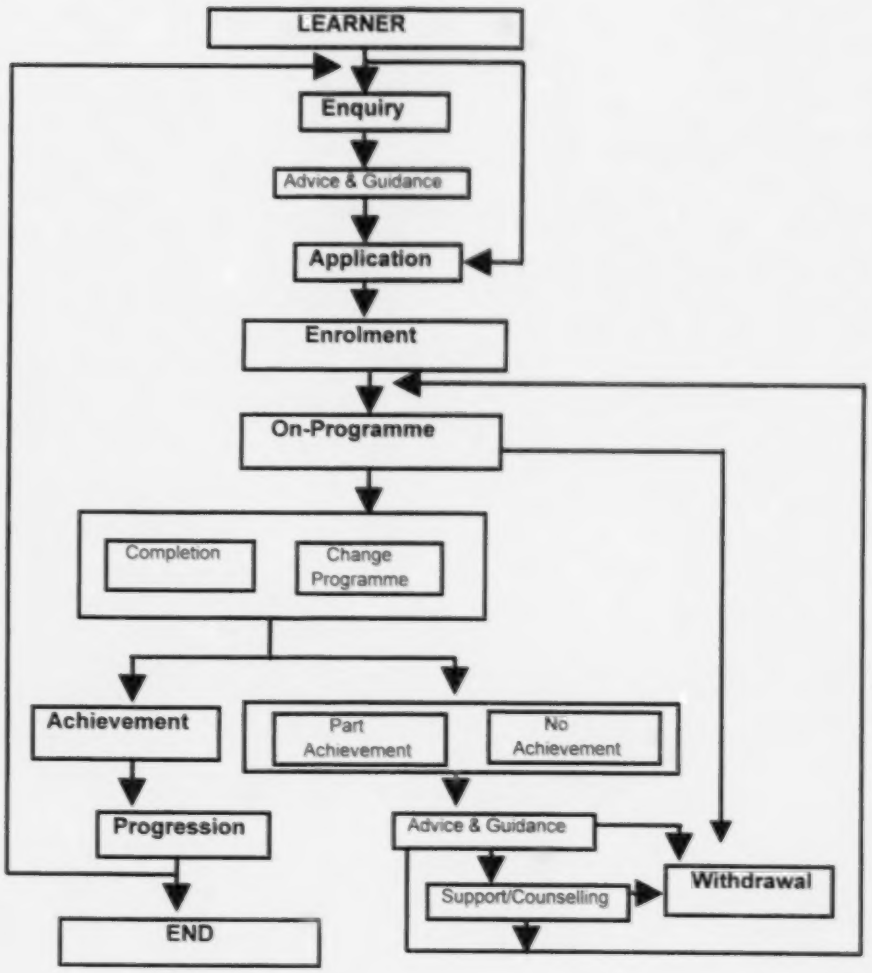


Diagram 2 **Learner application**

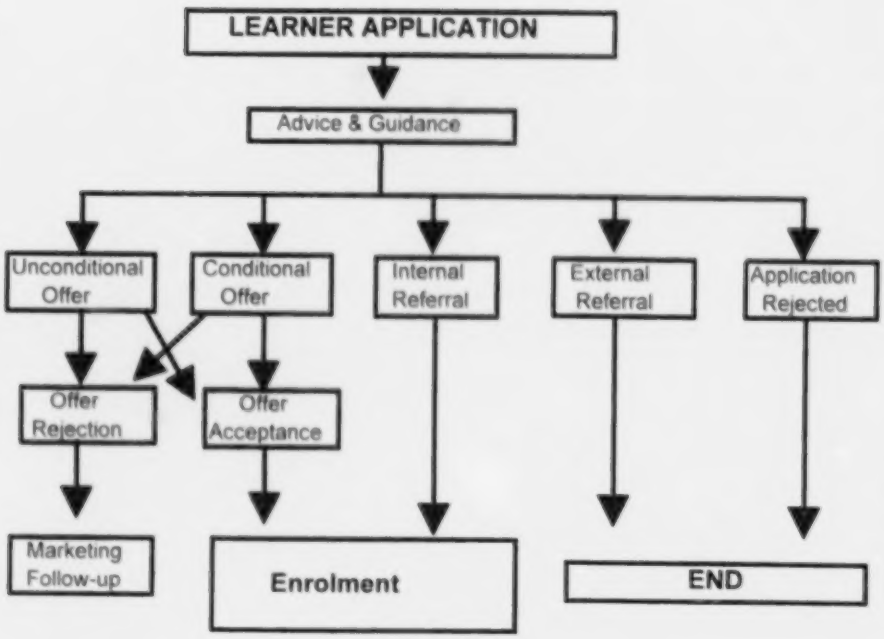


Diagram 3 **On-programme learner**

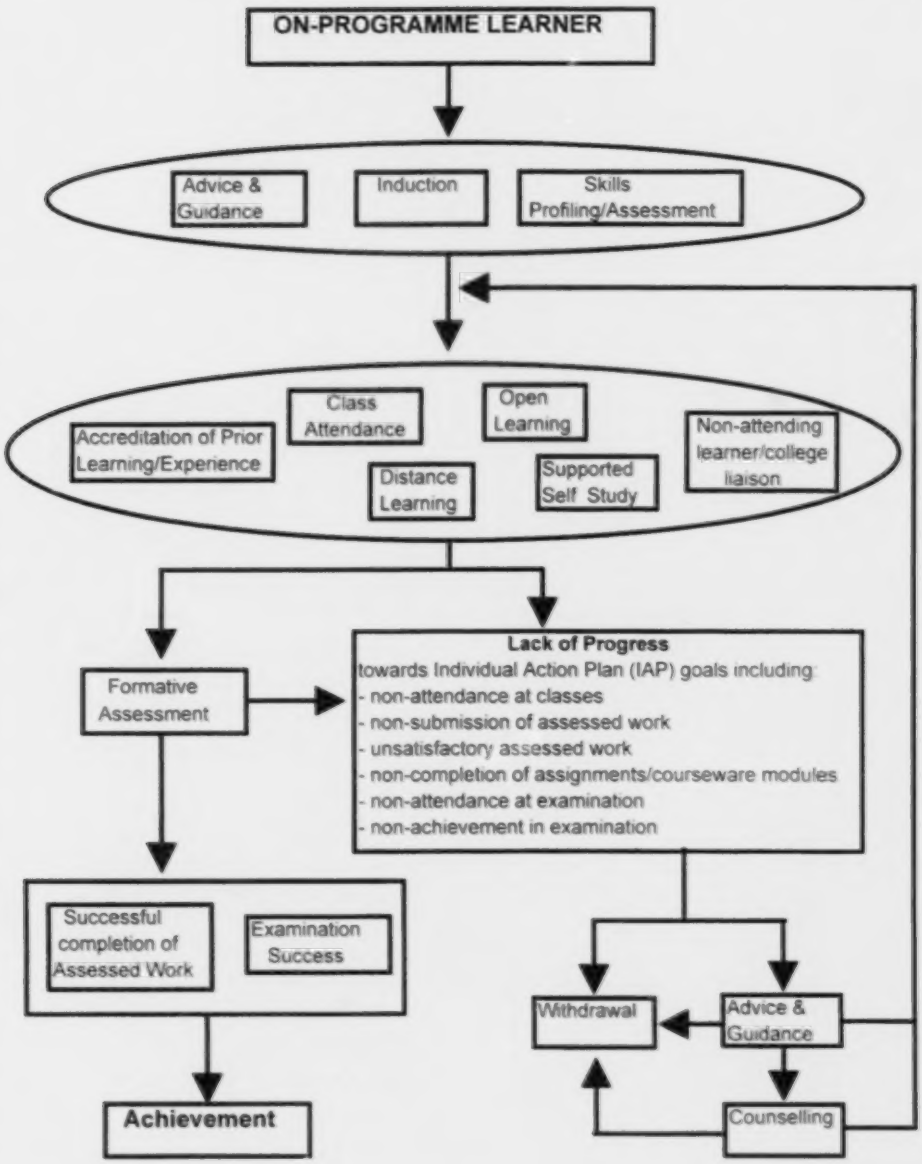


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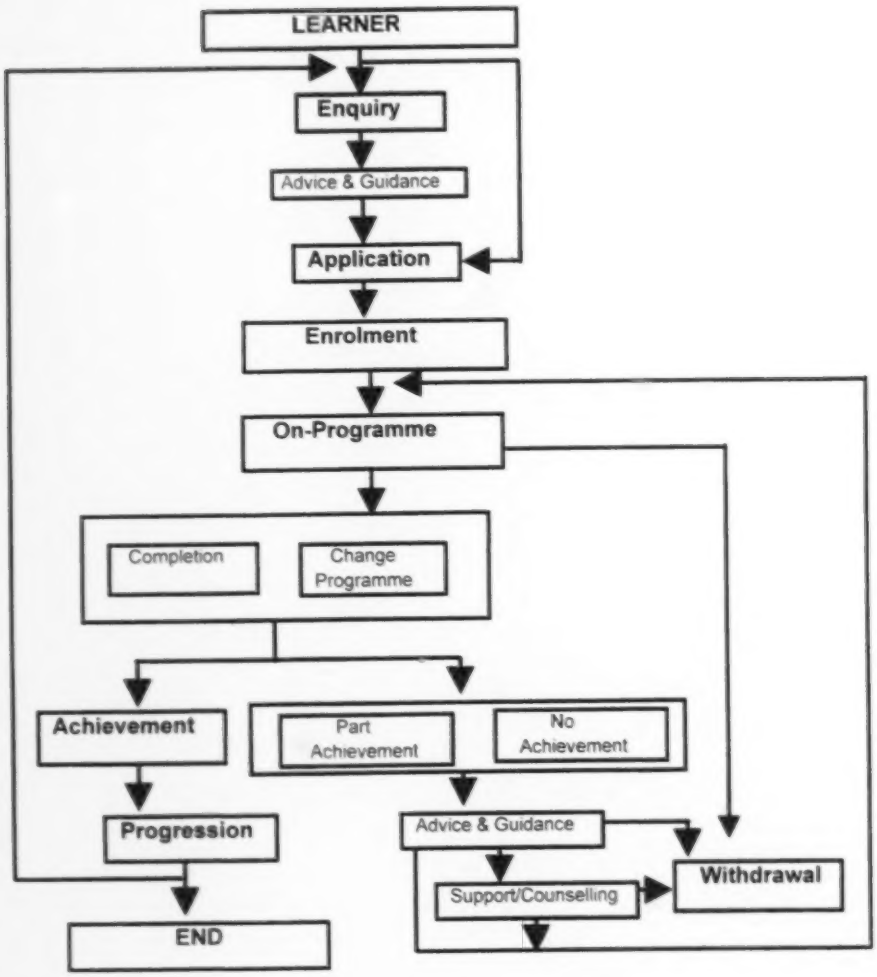
Diagram 4 **Progression**



11 Analysis of student experience and information systems best practice

An analysis of each part of the student experience with some data requirements and research findings.

11.1 Enquiry

Description	Data capture/requirements	Current systems	Best practice
Initial point of contact for individual student with College, prior to application and firm decisions on qualification aims (first trawl for details of individual student)	Name Gender Address Postcode Option to generate Student Identifier Option to generate action(s) Option to track actions/results of enquiry (audit/quality) Subject area Link to main student record system	As per details in case studies	Postcode Enabled Links into student record system Links to audit/quality processes (PIs) Facility to generate year by year comparisons and trends. Warning feature on action requested to meet targets. Interfaces with other applications to ease production of personalised documentation – standard letters, etc. Facility for prospective students to view the curriculum on offer. Option of tracking conversion of enquiries into applications Remote access/Rapid entry. Options to profile enquiries/ applications by demographic and geographic area.

11.2 Guidance

Description	Data capture/requirements	Current systems	Best practice
The provision of impartial advice to support the individual student in progressing their initial enquiry. It could cover Initial Assessment/ Accreditation of Prior Learning (APL)/ Screening/ Action Planning/ Careers/Finance	Name Gender Address Postcode Student Identifier (Option to generate full personal data set) Option to track actions/ results of guidance (audit quality) Option to link to Initial Assessment (IA)/learning styles/APL/ Career routes/ welfare Links to main student record system Options to generate statistics and links to labour market research		Links to student record Explicit flagging of different types of guidance for quality checking/ assessing effectiveness. Options to provide and track guidance process by electronic communication/peripheral devices.

11.3 Application

Description	Data capture/requirements	Current systems	Best practice
More focused enquiry, with the option of more specific guidance, leading to a request to undertake an individual programme of study (Applications may/may not be accepted)	Name Gender Address Postcode Student identifier (Option to generate full personal data set) Personal detail update; qualifications, general support, requirements Option to link to guidance data to provide indicators of effectiveness of guidance process. Option to link to staffing/interviewing		Links to enquiry/guidance through to application Links to enrolment/monitoring enrolments v. targets Links to funding/predictors/trends for management/strategic planning/subsequent action Links to staffing/ interviews Links to timetabling Direct communications with other on-line services (eg. UCAS, GTTR) Peripheral devices to give access to learning through technology for those with physical difficulties/ disabilities

11.4 Enrolment

Description	Data capture/requirements	Current systems	Best practice
Process which culminates in the signing of a learning agreement (may cover one/more qualification aims) (may include elements of advice/guidance/ diagnostic support)	Final trawl to build up comprehensive personal data set (As per ISR - learning support, additional support) Links to external funding requirements/options to generate information and calculation of units/ what if scenarios/ reports for management		Links with financial transaction system(s) Options to cater for bar codes. Options for direct on-line enrolments or off-line. Print facilities for receipts. Reports on cash transactions/record. Option to generate student ID/ facilities. Option to link to resource planning systems. Option to track/audit all aspects of enrolment processes eg. available places in programmes

11.5 On programme

Description	Data capture/requirements	Current systems	Best practice
Describes all activities of learning and accreditation of achievement, including assessment, general and specific student support services, and enrichment activities. * The student status during the on programme element should be ascertained in a different way. Are they following their IAP? No correlation between 'attendance' and being 'on programme'. Logging the use of resources. eg. individual logins to track IT usage.	The type of learning programme including mode of attendance. Specific additional support provided. APL. Guidance and counselling throughout the programme. Programme review Student support services. Date student leaves programme		Potential of tracking dynamic links between learner and all types of resources.

*As defined by FEFC Circular 93/20

11.6 Induction

Description	Data capture/requirements	Current systems	Best practice
A process which each new student undergoes to ensure the student is familiar with key College and programme information and procedures	Tutor's name/tutorial information and arrangements Assignment dates / results from diagnostic assessment Additional support Individualised timetable/ induction checklist		Induction programme. Linkage to ISR

11.7 Learning support/additional support

Description	Data capture/requirements	Current systems	Best practice
Direct support which is over and above that which is normally provided in a standard learning programme. The additional support is required to help students gain access to, progress towards and successfully achieve their learning goals. The need for additional support may arise from a learning difficulty or disability or from literacy, numeracy or language support requirements.	Who, when and what. Need to include all evidence required for funding purposes.		A complete log of all additional support activity.

11.8 Early leavers and individual action plan modifications

Description	Data capture/requirements	Current systems	Best practice
Early leavers Those students who do not complete a learning agreement. **IAP modifications** Modifications include partial withdrawal, change of programme, change of mode of attendance, target time for completion.	**Early leavers** Minimum requirements are set out in the ISR and PISA. Monitoring of registers for attendance/absence. Identify information needs (categories) to monitor all systems that affect retention. **IAP modifications** Changes to individual programmes record.	Only about half of college's collect data on early leavers' destinations although more collect some information on reasons for leaving. Different categories of early leavers vary in college's from 4 up to 25.	Early leavers identified quickly, exit interview arranged and reasons for leaving sought. Identified data that allows analysis of reasons for withdrawal. Analysis of data by module/ course/ programme and identify potential improvements to: • guidance • counselling • initial assessment • module/course structure • module content, timing and method of delivery • student support/travel

11.9 Achievement

Description	Data capture/requirements	Current systems	Best practice
The progress made by a student towards achieving the objectives in their IAP.	Intermediate as well as summative achievements.		Links to value added, awarding/examination bodies. ,PIs, qualification aims, computerised record of achievement, full recording of formative assessment.

11.10 Destination

Description	Data capture/requirements	Current systems	Best practice
	Minimum requirements set out in ISR and PISA. ISR in 1995/96 covers 8 categories, PISA 5 categories. There are differences in definitions (intended and actual destinations. Destinations of all full and part-time students required. Monitor registers for those students completing. Examination/ student registrations for awards and final outcomes including modular/CATS outcomes. Identify additional information needs (categories) to monitor all destinations of completers. Data capture from individual students via paper form. Data capture from UCAS, career service (preferably electronically)	Most colleges cease to update destinations data at the end of October after departure for full-time students. Systems involving tutors interviews provide better data return than other systems.	Questionnaire generation and analysis. Links to learning programme(programme review)/individual action plan/ enquiry & access. Recording of future employers , jobs, colleges, courses, qualifications. Links to external training/employment databases if available. A few colleges continue to collect data throughout the year. Combination of interview, telephone, questionnaire and other sources used to collect the data. Analysis of data provides information to/on • curriculum areas • content/relevance/career choice/ • progression • employment • labour market • marketing • publicity • quality assurance.

12 Recommendations

The following initial recommendations are the result of the work of the project team, followed by sector consultation to gain consensus and to identify any omissions.

12.1 Colleges

Considerations of the learning environment of the future demand that existing underlying assumptions about student tracking for the further education sector need to be reviewed as a means of identifying the key questions for resolution long term. Students will access learning and support in a range of ways to suit individual circumstances and needs. Learners of the future will include

- college based learners
- in-company trainees
- remote learners

Student Information Systems will need to be designed flexibly to enable tracking all these forms of learning and support.

Colleges are recommended to

- Review and redefine their IT and IS strategies to reflect the need to supply dynamic interactive support for learning
- Plan for the integration of their information and learning technology systems in strategic and operational terms.
- Decide how to integrate their systems in terms of management and organisation to provide clear and coherent structure for Information Systems and Learning Technology.
- Aim to provide a comprehensive structure for planning and implementing learning technology in terms of:
  - curriculum
  - staff development
  - support systems
  - technical matters
  - networking
  - Student Tracking Systems
- Determine the finance which can be committed towards implementation by undertaking a cost benefit analysis to clarify the opportunity costs of continuing to maintain discrete systems and the timescales over which implementation will be possible.
- Review issues around numbers of users and volumes of data which demand an integrated not a monolithic system
- Devise a strategy to provide controlled and appropriate access to all users including students and staff.

12.2 Funding Bodies

National steers through the Kennedy and Tomlinson reports encourage colleges to increase participation and satisfy individual needs through offering alternative delivery options and an increasingly unitised curriculum. Every review point of the funding methodology and its associated data requirements should start with the learner and put their needs at the centre. Funding criteria should not unduly influence the decision making process for the individual student. The structure of the system should focus on the need to support the learner. FE institutions need to be able to focus on developing systems which meet the needs of their learners. FEFC should ensure that the funding methodology responds to this and should continue to fund ongoing development in this area

FEFC should consider

- The example of sector initiatives like QUILT which will provide a focused staff development programme for ILT staff. There is a need for a parallel initiative to cater for systems development within colleges which support student learning.
- Promoting the development of a national single student identifier

- Encouraging commonality of data requirements for all awarding bodies.
- Whether attendance tracking is possible for every learner of the future
- A commitment to the promotion of life long learning by removing the current time limit imposed on the achievement of qualification aims.
- Extending the funding methodology to enable the funding of the study and achievement of part qualifications. Credit based developments provide a clear framework for this.
- Reporting and audit requirements for all funding bodies should be consistent and congruent with the student tracking model

12.3 Software houses

Software houses, and in house development teams, should be committed to

- developing systems that ensure integration. They will need to develop common interfaces between the discrete parts of student tracking systems.
- building into their software mechanisms to cater for the security and restricted access required with a more diverse user population.

12.4 FEDA

- FEDA should continue to collate and disseminate good practice.

13 Next phase

The project was planned in two stages

- Stage one to map out a functional specification and to achieve sector consensus on the specification.
- Stage two to develop further the technical aspects by defining the standard interfaces between different components of the system and to operationalise the specifications, test, evaluate and refine them.

This will allow the project team to make clear and full recommendations to software houses, FEFC and the sector.

The first phase of the project has identified key aspects of the structure for a student tracking system and good practice in the use of this system. To check:

- the appropriateness of this structure
- the usefulness of this student tracking specification and aspects of the system
- what volumes of data and data entry time aspects of the system will generate

It is essential to have a pilot phase of the project.

It is recognised that no single college will have a system that fully meets the specification, however many colleges have developed or are in the process of developing systems which deliver some aspects of it. The project would draw together this existing good practice to further develop the model and to disseminate this across the sector.

The proposed approach for stage 2 is that colleges will be invited to bid for funding to carry out pilot projects. Successful collges will be asked to produce for each project

- Project plan
- Ongoing report
- Evaluation of the project

Suggested timescale

Time	Activity
October 97	Ask for bids
November 97	Consider bids
December 97 – April 98	Project
May – June 98	Evaluation and recommendation
July 98	Dissemination

14 Acknowledgements

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We would also like to recognise the professional contributuion made by staff of both FEDA and the FEFC.

The project team would also like to thank those who have contributed towards the production of this report via consultation and dissemination events.

Appendix 1 Project Team

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Appendix 2 Case studies

Case study **A** Student tracking at a Sixth Form College

Case study **B** Wirral Metropolitan College

Case study **C** Newark and Sherwood College

A Student tracking at a Sixth Form College

System used - SIMS

The College has been using SIMS products for some eight years for general administration and partial student tracking. SIMS was developed for the schools sector and as Sixth Form Colleges remained in the schools sector for some years the system was of some use to Colleges. The College piloted the system for the county and has had a great deal of influence of its development for Colleges over the years.

Incorporation and the inclusion of Sixth Form Colleges into a new FE sector brought with it many changes and a steep learning curve particularly for Sixth Form Colleges. Limited resources had been spent on MIS, and the external returns although complicated were adequately catered for by SIMS. FESR and the idea of individualised records, vocational qualifications and part-time and adult students were all new concepts to be absorbed, planned for and systems put in place. SIMS had been developing a financial package for grant maintained schools and found that it could easily be adapted to serve the new post-16 sector. SIMS already had a good share of the sixth form college market and the decision by APVIC (the Sixth Form Colleges association) to recommend the financial package to Colleges persuaded SIMS that they should develop a product to serve the needs of the post-16 sector.

SIMS has sold its products on the basis of being a fully integrated system. Links are planned but as yet many are still missing. However it has changed radically and provides much of the basic functionality required of a tracking system. A central module holds all the basic personal and academic information on students. It is all date sensitive and it is possible to know the status of a student on any particular date. The other modules all integrate to some extent with STAR and to a more limited extent with each other. The ISR picks up information from STAR and EXAMS. SIR has been integrated into Personnel. PISA picks up information from EXAMS.

Following the process of the College using SIMS

Pre-enrolment

Either Enrolment Manager or STAR can be used for basic entry of personal details of students. Course request details can also be entered via both modules. Enrolment manager is used to hold initial enquiry information and pre-enrolment actions. These actions are user-defined and include logging, e.g. sending a prospectus, interview letters, receiving applications, letters of acceptance etc. This module can also be used in conjunction with a till for collecting fees, issuing receipts. As the college obtained most of its 16-19 student data by electronic transfer, the enrolment manager was to be used mostly for adult education and evening classes. It could be used by to fill up classes consecutively and to give an on-line report refreshed every 10 seconds.

Enrolment

The bulk of the College's enrolments are in the 16-19 age group. All students study mixed programmes i.e. a mixture of vocational and A-levels or GCSEs. All have some element of complementary study work. Enrolment consists of entering or confirming students' choices of courses, admitting students to the College giving them a unique number and a date of programme of study. A module called Options is then run to balance sets. The learning agreement is not built in and has to be designed by the user. It is possible to design something within SIMS but it is not satisfactory. Export to a word processed form is better. SIMS have recently recommended Crystal reports to complement their system and this should make the production of a learning agreement much easier. Data is checked on enrolment, exam results are recorded manually and later transferred to SIMS. It is possible to transfer exam results from partner schools electronically.

On-programme

The database is structured to cope with qualification aims divided into modules and courses divided into components and classes. There are many-to-many links between all these levels. Course and class end dates are recorded in SIMS and all course changes are recorded. All editing is done centrally for control and accuracy purposes. It is not possible to restrict access to a defined group of students. Reasons for changes are held in a user-defined field which is not entirely satisfactory. Personal tutors, class tutors and Heads of Department are informed of course changes. A date sensitive population analysis allows monitoring of classes although a retention report would need to be built on a spread sheet. Early leavers are recorded together with their destination and more recently their reason for leaving. All look up tables can be modified by the user to suit the needs of their own Colleges. Units generated by students can be regularly monitored through the ISR module. The students' attendance is monitored daily in classes by the Monitor module. At present data is keyed in on a daily basis and daily reports are sent to Personal Tutors.

Achievement

The exams module as an administration module for A-levels and GCSEs is fine but it is definitely lacking on the vocational side. All results are received electronically and ultimately stored in STAR. Recording of other achievement is restrictive and as yet is of little use for tracking students achievement during a course.

Having achieved the ISR SIMS is now concentrating more on internal needs. Since our last meeting, we have received an upgrade which includes longed for functionality particularly for the administration of the College and the MIS reporting which has so far been lacking. The increasing complexity and flexibility inevitably makes the system less user friendly. However sitting over SIMS is a management read-only module which is fairly user friendly and gives managers much of the information they require on a daily basis. There is a need for developing the tracking of student achievements throughout the year. This has been highlighted by the College's move into franchising, ESF etc.

Within the College, training of staff to both use the system and the information it holds is vital if the significance of providing good accurate and timely data is to hold credibility.

What to track	Status	Forward strategy
Enquiries	Menus and reports can be generated to track enquiries and applications by prospective students (adults only)	Extend to all students
Applications	SIMS Enrolment manager converts enquiries into applications. Unique student number generated. 16-19 student data from partner schools transferred electronically	Establish systems to process data collected from remote franchise institutions
Guidance	All paper based	
Enrolment	Reports available – real-time screen in Enrolment manager monitors enrolments to courses and classes	
Personal data	Data captured during application and/or enrolment can be down-loaded to other applications	

What to track	Status	Forward strategy
Learning support	Paper based recording	
Additional Support	Paper based recording	Use of computerised system not part of SIMS system
Programmes of study/ Learning agreements	Data down-loaded into word processor	
Funding attracted	ISR module calculates funding units for each student by course. Ability to monitor units generated	
Attendance/ retention	Attendance module linked to central module. Manual data entry. Reports record attendance patterns and retention.	OMR data entry
Timetable	Prepared manually - transferred to central system. On line clash warnings available. Student timetables, course and class lists produced. Attendance registers generated	
Use of learning resources	Mostly paper based.	
Assessment/ progress	Paper based system	
Achievements over time	A/AS & GCSE information automatically fed into central module. Vocational achievements entered into MIS system and used to compile ISR	Vocational qualifications management module currently being developed by SIMS
Destinations over time	Reply paid information request card supplied with results. Telephone enquiry to those who do not reply. Data entered centrally on to MIS system	
Early leavers and course changes	MIS system used to generate regular reports of early leavers and course changes	Develop system to record reason for course change
Franchising	Mostly paper based systems	Develop a method of collecting data electronically

B Wirral Metropolitan College

Wirral Metropolitan College is a large general FE college. Measured by its income, the College is the fourth largest provider of FE in England. During 1994-1995, there were 34,100 enrolments, equivalent to 8,023 full-time students.

The College operates in an area of stark contrasts. The borough's urban areas are characterised by multiple social and economic disadvantages, whilst its rural areas are relatively prosperous and attractive to the affluent employed and retired. Economic indicators, including Objective One status, provide a measure of the difficulties facing the urban areas. Here, the combined effects of relatively high unemployment, new and changing employment patterns and low expectations, present an enormous challenge to education, training and other providers.

The College's mission requires it to make access to study easy for the greatest number of possible students. As a consequence, the portfolio of programmes is wide and extensive. Programmes are offered in all the FEFC programme areas at most levels. In addition many programmes are offered across a number of local centres in response to the perceived public preference for locally based provision. The College has pioneered work on a 'learning framework' whereby all programmes are described according to a common specification and fitted into a system of levels and credits. It is anticipated that the work associated with the development of a credit accumulation and transfer system will continue and that the modularisation of programmes will grow as part of the College's approach to increasing flexibility and improving effectiveness and efficiency.

If we define student tracking as *the collection and use of information (for curriculum, management, administrative and funding purposes) about individual students and their progress at all points of contact with the institution*, it is clear that the implications for student tracking are both considerable and urgent. The College welcomes its participation in this project as a means of helping it to move this particular agenda forward within the organisation and to build on the developmental work already undertaken in specific areas.

2 Tracking status

The existing mechanisms for student tracking include both manual and computerised systems, with varying degrees of success. WMC is yet to realise a totally integrated approach to student tracking. However, it is investing considerable time and energy to improve the integration and consequently the accuracy of its systems across the whole college.

2.1. Initial enquiries

Initial enquiries are recorded by the College Advisers. Enquiries for full time programmes are logged on an admissions database and can be searched and analysed by the data recorded (eg. post code; area of interest etc.).

2.2. Pre-enrolment/ advice and guidance/ enrolment/ Learning Agreement

Pre-enrolment advice and guidance and enrolment details are recorded manually on an enrolment form. This is supplemented by a learning agreement, together with records of any specific advice or guidance received. These lead to

- tutorial record and the Learner Record
- filing of the enrolment record (for audit purposes)
- entering of the student and programme details onto the central FEMIS student record (This includes the individual student (lifelong) identification number)

Each student studying for 3 hours per week or more is assigned a personal tutor, identified by a unique reference number on the central student record (DRS). This facilitates monitoring and checking of correct allocation and allows the final stage of the Learning Agreement to be directed straight to the personal tutor for confirmation with the student.

The Learning Agreement is printed out from the DRS four times a year. The first time for each student to sign; subsequent printouts are to confirm or amend of the details of the learning programme.

2.3 On-programme

Personal tutors have an explicit role in maintaining an up to date awareness of

- the individual student learning programme details
- attendance and progress
- reporting achievements
- reporting withdrawals and transfers (via the Student Records Officers in Schools Offices).

Changes and amendments to the enrolment record lead to

- documents in the student's Learner Record
- paper record of the changes made (for audit purposes)
- amendment of the central student record

Student attendance is recorded manually on a class register and monitored locally by personal tutors. It is monitored centrally by retention clerks, who liaise with the appropriate Heads of School/ programme teams as necessary.

Examination and accreditation entries are processed centrally by the examinations office, with reference to the enrolment record. These are subsequently recorded on the FEMIS record. Results are entered onto FEMIS record and used to compile the ISR.

2.4 CMLR

The College has developed a Customised Menu Learning Resources (CMLR) system to organise access to the range of resources now available electronically (eg. in-house learning materials, information databases, internet resources, e-mail, software applications, etc.).

CMLR facilitates the organisation of one of the major components of the learning situation, acting as an IT integrated structure for any programme. It allows staff to present their own resources that they feel are helpful for the learner, and guide learners to other information resources that they will increasingly need to use autonomously.

The incorporation of a Resource List allows the tutor to include information on why the selected materials are relevant to learners studies and how they can be used. They can also use it to point to resources that aren't stored electronically. This information can be updated automatically.

The most flexible facility is the provision of an Alerting Service on materials and events that relate to any area of study. This could include information on new traditional materials, appropriate TV programmes, exam information or even changes of room.

The CMLR can be implemented and used at a variety of levels according to need but is best used by staff and students who are working flexibly in the learning situation because of the inherent flexibility of information technology.

3 Other developments

The College has been involved in a number of projects and developments which have

- informed our approach to student tracking
- are likely to have a significant impact on student tracking

3.1 PMS – LF

Before the full impact and implications of the ISR were known, the College commissioned work on Performance Monitoring Systems – the Learning Framework. This was a comprehensive tracking and profiling database, specifically designed to accommodate a unitised, credit-based curriculum.

Written using Borland's DOS based relational database PARADOX, PMS-LF comprised various modules, each performing separate functions.

The individual options within the software included

- Action planner

- Individual Profile of Performance
- Assessment toolbox
- Progress/Curriculum Tracking
- Framework Toolbox

Other facilities in the database

- allowed easy input, structuring and correlation of curriculum information
- allowed learners to view overall programme details and individual unit details to help them select appropriate programmes/units of study
- supported the production of action plans
- could track and record student progress against the units of assessment and accreditation entered into the database
- offered a skills and knowledge based assessment facility through either automatic generation of assessments or creation of individualised assessments (automatic and manual marking facility)
- offered an on-line registering, enrolment, tracking and updating facility with multiple search options against data captured

3.2 Learning Environment (LE)

The Learning Environment (LE) Club is a vehicle for exploring the use of an on-line learning environment for flexible and distance learning, both on campus and for remote delivery into the workplace. As well as conducting an evaluation of the supporting technologies available for this mode of delivery, the club is actively looking at the wider implications of its use in the institution in areas such as curriculum management and student tracking.

The LE Club was formed to explore the delivery of learning through IT, and the integration of this within a managed and supported environment. Under the club, a prototype Learning Environment was developed and trialled, and associated educational, management and staff development issues were addressed.

The technical lead was provided by Fretwell-Downing Data systems Ltd, but the membership comprised 11 UK colleges. In addition to these institutions, the South Yorkshire Open College Federation was an associate partner and Sheffield Hallam University was a research partner.

See Case Study C Newark and Sherwood College *for details of this software.*

3.3 BTEC and Blackwell Pilot Project for Automated Assessment

Blackwell and BTEC have come together to develop software assessment materials for GNVQ students. This software will deliver benefits to BTEC colleges such as a reduced administrative burden in the delivery, recording, maintenance and management of assessment, the better direction of scarce teaching resources, and a potential provision of a better service. Based on a combination of Blackwell InfoCheck software and BTEC testing materials, an assessment environment which allows comprehensive testing, monitoring and reporting is being prototyped.

The College is one of six centres nationally participating in the pilot.

3.4 Staff Development

Within the College, staff development is seen as crucial to help staff use the information systems and exploit the technology more fully as a tool to support learning.

What to track	Status	Forward strategy
Enquiries	Specific menus and reports are generated using SQL, to track enquiries and applications by prospective students (FT) (FEMIS). Data can be searched by any field. Usually used to find out whether student is already on file although specific requests/reports can be generated (eg. analysis by post code). Automatic generation of class lists possible.	Postcode enabled
Guidance	Predominantly paper based. Various in house developed packages available on network to provide information and contact names for referrals.	
Application	*As enquiries*	
Enrolment Student Personal Data Set	Available from ISR (FEMIS) Potential to generate range of reports. Facility to transfer data captured into spreadsheets/ other applications using FTP.	Move towards modular solution to provide increased flexibility/ user friendly interface/ allows mapping of curriculum to any level.
Induction/Screening	Predominantly paper based. Various in-house developed packages available on network to support Induction/Initial Assessment. No links with student record system.	
Learning Support Additional Support	Manual recording on enrolment form/ learning agreement followed by entering of student/ programme details on central FEMIS system. *See* On Programme *notes*	
Funding Attracted	DLE	Explore possibility of using Tariff Tools for FEMIS.
Timetabling On Programme Attendance/ Use of Learning Centres	Predominantly manual systems. Information collected locally and transferred to central system	
Retention	Manual system of register checking to generate standard letters re non-attendance etc	
Use of Learning Resources	Customised Menu Learning Resources. *See notes on* CMLR	
APL/Assessment Progress ROA	Stand alone 'in house' developed systems to record APL, individual action plans and subsequent progress being used in particular areas Record/ROA system available on WAN (Claris Filemaker Pro 2.1)	Links to student record system.
Achievement over time	Processed centrally by exams office, with reference to enrolment record, subsequently entered onto FEMIS record and used to compile the ISR.	Explore potential of FEMIS exams module

What to track	Status	Forward strategy
Early Leavers	Monthly generation of range of reports on early leavers	
Destinations Over Time	Information from FEMIS used to conduct postal surveys of destinations	Electronic data interchange between feeder schools/ TECs/ HE etc.

C Newark and Sherwood College

Newark and Sherwood College is a small/medium general Further Education college which serves a mainly rural community. The College has enrolments in all the FEFC programme areas. In the academic year 1994-95, 5,424 students were enrolled of whom 1,782 were following non-vocational adult education courses. Of the 3,642 students studying vocational and general studies course, 35% were full time.

According to the 1994-95 FEFC performance indicator data published for all Colleges, the College is in the top 25 per cent for its college type in achievement of funding target (113%) and average level of funding (£14.83).

1 Student Tracking Rationale

The need to develop credible holistic student tracking systems is well understood in terms of their contribution to providing inter alia key MIS data relating to the funding process, facilitation of retention, and providing an interface between the administration and delivery processes.

Student tracking is about handling information. Improved information systems which enable core data to be centrally held but be available to all with access to and sharing of information, at all levels, are key components of the College's cultural development.

Much of the College's future strategic orientation is based on an advanced Information and Learning Technology (ILT) vision which is intended to substantially enhance the College's role in supporting access to Lifelong Learning in its community. Student tracking at Newark aims to build on the experiences of integrated learning and information systems.

2 Tracking Status

The current status and forward strategy are summarised in Table 1. In addition there are a number of inter-linking projects and developments in hand within Newark & Sherwood College that have an impact on student tracking activities.

Education Business System (EBS)

Newark and Sherwood College has recently moved from using FEMIS to EBS from Fretwell Downing. This is a Windows 95 based package which maintains data in Oracle tables. The heart of the system is the curriculum model, which enables the development of a unitised curriculum with maximum flexibility. Tutors will be able to see appropriate information from the system on their desk tops.

Forward Strategy

Student, staff and curriculum data went live at the start of Autumn term 1996. During 96/97 further elements of the suite will come on stream (eg: Unit Planner – modelling of FEFC units; Strategist – modelling of whole College and On Course- an on-line prospectus).

All current 'stand alone' systems will be migrated to the EBS system.

NewTrax

Another in-house development is NewTrax – a Windows 95 based system that allows for the planning, design, delivery and post delivery control of GNVQ and NVQ syllabi. NewTrax is graphically based, with a mouse to point and click on graphics and icons to drive the system. A course is designed from the high level integration of the elements in units down through the elements, PC's and onto tasks for assignments. Data is drawn from, and stored to, databases – tasks only need performing once and data is handled a minimum number of times. Delivery to students can be via hard copy, through e-mail, or a mechanism like Exchange Server or other group working systems. Marking of the resulting work is done against the tasks set in the assignments with automatic accumulation and reports to see where students are succeeding or failing.

Best practice

- improved quality
- standardisation of paperwork
- interface with MIS

Forward Strategy

- Software to be piloted in the Autumn term.

WorldView

This is the Fretwell Downing library system and runs on Windows 95 environment.

- Electronic record of learning resources
- Database of Learning Centre users shared with MIS
- Information seeking now a 'one-stop' activity
- Information held is multi-media (ie. text, images, sound, video and WWW pages).

Forward strategy

- Generation of multi-media learning resources. Students will be able to access the assignments and later learning materials from the desktop. Access to the materials can be tracked when the student logs onto the system.
- Integration of electronic mail and forms with user workspaces – implemented with Exchange Server. This allowing us to benefit from the well known functions of electronic mail in a managed and trackable group environment of shared resources and access.
- Making this environment available to all users at all locations.

Learning Environment (LE)

This is a parallel development by Fretwell Downing in which Newark and Sherwood College is a development partner.

The latest version of this software builds on the WorldView described above and incorporates the concepts of student and tutor workspace and interactive assessment. A typical process can be the student logging on, looking at their individual programme of study/ activities outstanding, reading an assignment, completing the assignment and storing in their 'workspace'. Later, the tutor can log in, look at their case load of students, call up completed work, assess and record it, and return it to the student workspace appropriately annotated.

Forward Strategy

- Linking the LE to MIS

Accuplacer

This is an American package that enables adaptive testing of literacy and numeracy skills. Students use the package to answer a series of questions which are marked by the computer, and results are printed/collated. The results enable the college to initiate plans of additional study, which will in turn increase students ability to achieve their learning aims. Higher retention rates should result.

This package was trialed with a small sample in association with other colleges last year.

Forward Strategy

- A much larger trial started in September 96.
- The provision will be available throughout the College network and at the remote sites.
- Assessment on demand

ILT Staff Development

The College's staff development strategy is directed towards a future in which the acquisition of ILT infrastructure, the development of skills amongst staff to take business advantage from that infrastructure, and not least managers capacity to use the infrastructure to manage their decision making are central elements in planning.

Consequently, all staff are taking part in tailor-made training built round the Microsoft office. This is designed to equip them with the necessary IT skills to maximise their collection and use of information. In parallel with this is the national FEDA ILT initiative, which aims to address curriculum delivery and ensure that innovative ways of learning are maintained and developed within a high quality framework.

What to track	Status	Forward strategy
Student number	EBS generates a unique student number which can be used to identify all students' activities. Link with the Learning Environment	
Enquiries and applications	Developed, in-house, an Access data base to track enquiries and applications by prospective students. System holds data which can be used to track the conversion of enquiries into applications and to profile applicants by a number of demographic and geographical criteria. Includes a rapid addressing (postcode enabled) software system. Data can be down loaded into EBS	Establishing systems to process data which is collected remotel
Guidance	All paper based	
Enrolment	Available from ISR	Real time monitoring of enrolments against targets. Live reports available 'on screen' to manager
Induction/ screening	Induction paper based with weak links to student record system. Screening – *see notes on* Accuplacer.	*See notes on* Accuplacer
Personal details	Available ex ISR	
Learning programmes/ programmes of study/ learner agreements/ individual action plans	All paper based	
Funding attracted	DLE	Unit planner a FD development allows units and hence funding to be what if'd. It performs a similar function to the FEFC DLE programme but is much more flexible.
Attendance/use of learning centres & retention	Manual system of register checks.	Electronic forms to tutors re withdrawals. Swipe card system introduced.
Additional support	*See comments on* Accuplacer.	Computerised claim forms for SLDD support.
Timetable	In house Access database.	Computerised registers generated from EBS will enable timetables to be generated. Live on screen timetable and course information available throughout the College
Use of learning resources	*See comments on* WorldView	*See comments on* WorldView

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What to track	Status	Forward strategy
APL/ assessment/ progress & ROA	*See comments on* NewTrax. Stand alone ROA software APL recorded manually.	*See comments on* NewTrax.
Achievements over time	Achievements entered into MIS and used to compile ISR	EDI (electronic data interchange) now available and automatically loaded into EBS Value added information enhancement.
Destinations over time	Information from MIS used to conduct Postal survey.	
Early leavers	Monthly reports on student withdrawals obtained from MIS. Phone call follow up to obtain reason for withdrawal.	
Marketing	Enquiry/application database enables staff to assess the relative success of marketing campaigns. An Access database has been developed for tracking business with commercial clients in terms of size, industry sector and locality. The data facilitates target marketing and the monitoring of client needs .	Map/postcode enabled visualisations of the College market place.
ISR information	ISR return from EBS	
Franchising	Mostly paper-based systems	

Appendix 3 Bibliography

Student Tracking project	FFORWM 1995 (Supported by FEFCW)
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'Managing the Achievement Curriculum: the opportunity for a College Information System'	A CATS/MIS Working Group Discussion paper, copies of which were circulated to FE colleges in England and Wales during January 1995
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'Bulletin: MIS and the curriculum'	FEU 1993
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'Implementing Successful Enrolment Management: a Conceptual Framework and Two Examples'	Craig A. Clagett *Paper presented at the Annual Summer Institute on Institutional Effectiveness and Student Success (Tacoma Washington, June 1995)*
Wisconsin Instructional Design System Documentation	
Student Tracking	NCET
Specification for a Student Information System for Croydon College	Croydon College
'Developing FE: Student Tracking'	FEDA 1996
Reviewing IT in FE	NCET 1996
Learning and Technology Report	NCET
FEFC Circulars and Manual	

Appendix 4 Glossary of abbreviations, acronyms and common terms

APL	accreditation of prior learning
CATS	credit accumulation and transfer scheme
DES	Department of Education and Science
EARS	electronic attendance radio system
FEDA	Further Education Development Agency
FEFC	Further Education Funding Council
FEU	Further Education Unit (now FEDA)
GLH	guided learning hours
GNVQ	General National Vocational Qualification
GTTR	Graduate Teacher Training Register
GUI	graphics user interface
HEFC	Higher Education Funding Council
IA	initial assessment
IAP	individual action plan
ID	identification
ILS	integrated learning systems
IS	information systems
ISR	individualised student record
IT	information technology
Learner	student
MIS	management information systems
NTET	national targets for education and training
OCR	optical character recognition
OMR	optical mark reading
PI	performance indicator
PIN	personal identification number
PISA	Public Information of Students Achievements
QA	qualification aim
RDBMS	relational database management system
ROA	record of achievement
Student	learner
UCAS	Universities and Colleges Admissions Service